Electricity for Nervous Diseases.

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THE TREATMENT

OF

NERVOUS DISEASES

BY

ELECTRICITY

A REVIEW

OF THE PRESENT EXTENT OF ELECTRICAL TREATMENT, WITH INDICATIONS FOR ITS EMPLOYMENT

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TRANSLATED FROM THE GERMAN

BY

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TRANSLATOR'S PREFACE.

I SUPPLY a want of my profession by the translation of the following clever monograph. The eminent benefits conferred on mankind by the introduction of electricity into therapeutics are so evident, that this branch of treatment is making rapid advances, to the gradual exclusion of inferior remedies in the respective pathological conditions. It therefore becomes desirable that every physician, whether he apply electricity personally or not, should be informed as to its uses, and the indications for its employment in special cases, that he may be able to fulfil the first duty of his art—to order the most appropriate remedy to each case.

Gentlemen who do not make the application of electricity almost or quite a specialty, have no strong incentive to study the more voluminous treatises on the subject, nor is it necessary that they should. So far as the welfare of their patients is concerned, it is

enough to know when and where electricity may be used with benefit; and a brief and comprehensive review like the following, which may be read through in an hour or two, showing the principal conditions where this comparatively new remedial agent has been successfully employed, gives all the information needed. The purpose of the author in publishing his essay may best be gathered from the text itself.

G. M. S.

160 Second Avenue,
New York City, October, 1874.

NEURO-THERAPEUTICS, like the art of which it is a branch, is a science based on experience. Its principles spring from the careful observing of a large number of cases of disease, and can be best understood by those who have a proportionate number of such cases at their command. Whoever has the opportunity of extensive observations of the kind, may not only find in it the justification of publishing his views, but an obligation to present them to the profession for the furtherance of both scientific and humanitarian progress.

As my cases for some years past may be numbered by tens of thousands, I believe I may claim the right to offer an opinion on the treatment of nervous diseases.

I have chosen for my subject the employment of

electricity in nervous diseases ("electrization," as electro-therapeutics is popularly termed, and by which the non-professional public understand nearly every possible thing), for several reasons. In the first place, because the science of electro-therapeutics has of late made rapid and steady progress, and this I consider it useful to point out from time to time; in the second, it may check the frequently inappropriate, and therefore useless, if not injurious, modes of electrical applications by unskilful hands; and lastly, on account of the many and not insignificant prejudices against electricity.

As to the progress that the application of electricity in disease is constantly making, several directions of this may be distinguished. In the first place, electricity has favorably influenced general therapeutics, inasmuch as that electrical treatment has supplanted methods that were not exactly in consonance with refined tenderness, although, according to former conceptions, they may have been part of the cruel necessity of science. Thus, I still remember having witnessed, some years since, the application of the actual cautery in so called *tabes dorsualis*, until the skin was burned along the entire length of the spine. This procedure of course did not the slightest good, but at that time the extraordinary

effects of the electric, and particularly of the galvanic current were not as well known as now. Hence it was that many physicians regarded *tabes dorsualis* as a disease that forbade all medical interference, and looked to nature only for its cure. At the present day this is not the case quite so often, as most physicians may justly claim the privilege of untiringly following up the advances of the several specialties in therapeutics.

A further acquisition of electro-therapeutics may be found in the facts that the indications for the special modes of application of the electric current continue to become more sharply and clearly defined, and that the "electrization" can be carried out more in accordance with fixed standards, by reason of which the entire proceeding gains essentially in regard to safety as well as success.

It may thus be determined with a certain degree of precision in rheumatic facial paralysis, when to employ the galvanic, and when the faradic current; when we may expect some good from one of these two varieties of electricity, while from the other we can hope nothing.

A further progress in electro-therapeutics may be found in its influence on the expansion of our knowledge of disease itself. From the nature of the suc-

cessful remedy and the manner in which it acts, we draw conclusions as to the nature of the disease that has been cured, and in this respect it is, among others, especially the electrical treatment of the sympathetic system that admits of such deductions. Thus I have been enabled solely by this means to trace back the nature of intermittent fever, at least in a large number of cases, to an affection of the sympathetic (neurosis sympathici). This mode of deduction can be still further pursued, and from the fact that in a large number of cases intermittent fever has proven an affection of the sympathetic system, it may be inferred that quinia, our most trustworthy remedy in intermittents, stands in special relation to the sympathetic nerve (resembling the relation that we observe between ergot of rye and the female generative organs). In this case electricity would have served not only to explain the nature of a disease, but likewise the relations of a certain other remedy to an important organ.

A further advance in the medical application of electricity consists not only in the fact that the knowledge of the laws governing its employment in certain pathological conditions is constantly increasing (as has already been stated), or, to quote the poet, "we have descended to the depth in which we find the es-

sence," but that we have also greatly enlarged the limits of its applicability.

The employment of electricity has, at the present day, been extended to so great a number of diseases, and the boundaries of its sphere are expanding in a manner so constant and fertile, that a short time since scarcely anyone could have even approximately formed an idea of the possibility of this expansion. Not only has the employment of electricity in medicine long since overstepped the limits of nervous disorders, where (acute cases excepted) it is almost universally employed ; so that, in addition to nervous diseases, we see rheumatism, inflammations and swellings of joints etc., drawn within the sphere of its usefulness ; but it has manifested its extraordinary influence also in affections that seemingly lie entirely beyond its range. Thus it is certainly something wonderful to behold in electricity (aside entirely from galvano-cautery) a certain means for the removal of cancerous and other tumors.

I purpose however to point out not only the great and constant advances made in electro-therapeutics to which these lines owe their origin, but, in contradistinction thereto, the oftentimes entirely inappropriate manner in which the different varieties of the electric current are gratuitously selected in

obedience to accidental extrinsic circumstances, their employment corresponding to anything but the laws of therapeutics. Thus it may be frequently observed that rheumatic facial paralyses are treated by the faradic current, even when the faradic irritability has long since disappeared (and the result of attempts of this kind is of course nought), in place of easily obtaining muscular contractions by the use of the galvanic current; or, a patient suffering from "*tabes dorsualis*" is treated by the same faradic current, and the strength of the already hypererethic muscles is still further exhausted, to the greatest injury of the patient. Not infrequently the occasion for such a proceeding is the lack of a galvanic battery, in which case it would of course be better to dispense altogether with electrical treatment. Not so very long ago, electrical treatment was carried out by simply giving the patient a pair of handles to hold in his hands, the electric current thus traversing the whole body, no regard being taken to the seat of the disease. That the nature of the current—whether galvanic or faradic—its strength and the duration of its application, were little considered in this proceeding, needs scarcely to be remarked. I must observe, however, that the reproach of instituting such absurd proceedings falls less on physicians than on patients them-

selves, which latter frequently content themselves with purchasing a faradic apparatus from some manufacturer, setting it to work, and then "electrifying" away. It has even come to my knowledge, incredible as it may appear, that here in Vienna people have gone to the "Prater," taken a few shocks from a frictional electricity machine in some booth, and were afterwards very much surprised that the "cure" was not followed by the desired result. It is true such glaring absurdities are the exception, but the bare fact that they can occur at all, proves that general education, especially as regards conceptions of the preservation and restoration of health, on the whole does not as yet occupy very advanced ground.

This deplorable condition of things also favors the more or less mysterious doings of charlatans of every kind, and their invasion of the territory of medical electricity. Quackery naturally finds its most fertile field where conditions come into play that are not very clear, and as, among the disorders of the various systems of the human body, it is precisely affections of the nervous system that offer greater obstacles to exact research than almost any other class of diseases, the imperfectly raised veil of this pathological picture of Sais is well adapted to afford the desired screen to doings that shun the light.

This is the more to be regretted in that not only is no relief obtained in individual cases, but electro-therapeutics is disparaged in a manner generally detrimental in the eyes of the non-medical—and even of a portion of the medical public, who, under the name of "electrization," identify procedures of this kind with a scientific mode of application. Whosoever then does not maintain an opposition to the laws of logical thought, should, when he hears of pretended unfavorable results of an "electrical treatment," ask himself first of all, whether this treatment was administered by a skilled or unskilled hand.

In discussing the judiciousness or injudiciousness of a method of electrical treatment, consideration should be had to the fact that electricity is frequently employed at an unsuitable period; sometimes too soon, much more frequently, however, too late. When all other modes of treatment have been tried and have failed, then the electric current is appealed to, in order if possible to perform miracles; and in some instances surprising results, approaching the miraculous, are indeed obtained. In a large number of cases, however, the "Too Late" of Cremieux, big with fate not only in the political, but also in other domains, maintains its rights; and disorders that, in the first stage of their development, had yielded readily to

electrical treatment, are at later periods unamenable to its influence.

I come now to speak of the prejudices which here and there are still current among the laity, although among the greater portion of the educated classes they may be considered as having been long since outlived.

In the first place, many persons do not know that there are various kinds of electric currents, not all of which are applicable in medicine. Naturo-historical knowledge is unfortunately but very sparsely sown, and where found is often imperfect, which is perhaps less desirable than its entire absence. By far the greater number of patients are cognizant of but one kind of electricity, viz.: frictional electricity, which is generated by the so-called electric machines. Almost everybody has seen such a machine, with its revolving glass disk, and many have afforded themselves the doubtful pleasure of taking a shock from one of them. Such patients then look upon every electric apparatus as a machine that dispenses shocks, and believe the entire electrical treatment to be a succession of such shocks; a sort of electro-flogging, to which they have to subject themselves by way of penance for some sin or other, and which they look forward to with more or less dread.—Is

the assurance needed that these apprehensions are groundless? It is not frictional, but galvanic and faradic electricity that at the present day are employed in medicine, and it is a matter of course that every physician who is familiar with the application of the electric current, will let this act only in such a manner, that the patients can bear the treatment with ease and without the least inconvenience. I at least have never had to contend against any opposition to electricity on the part of patients after these had once obtained a knowledge of the character of the remedy. Even children, where they had arrived at a period to make some use of their intelligence, lost all dread of the current. Thus, not long since, I attended a girl about twelve years of age (the patient of Dr. M. Schlesinger, of Vienna), possessed of great nervous irritability, who at the commencement of the treatment escaped from the room containing the electric apparatus, and who after a time became so well reconciled to the applications, that currents of considerable intensity were borne with ease.

The fear of pain, shocks, convulsing of the body, and whatever else may be the phantoms of an imagination led astray by a deficiency in naturo-historical knowledge, is entirely without foundation, provided the treatment is conducted by a physician

familiar with electro-therapeutics. It can become realized only when the electrical treatment is carried out by one who is either not at all or only imperfectly conversant with the subject. As everything else, so electricity also can be abused.

Another prejudice that frequently stands in the way of electricity is the strange idea that the electric current excites and irritates the nervous system. A very remarkable assertion indeed! There is scarcely a single remedy by means of which hypererethic conditions, from simple irritability of every degree, to the most violent *tic douloureux* or other neuralgic pain, can be removed with so much certainty as by electricity. All depends of course on the manner of making the application, and it is here more especially that all holds good that I have said in regard to the painfulness of the current. In the case of a lady, the patient of Professor Kainzbauer, who was subject to periodic violent attacks of excitement, a single stroking over the cervical sympathetic plexus of nerves was sufficient to give instant relief.

A mode of treatment which is capable of abrogating with such rapidity an already existing state of violent excitation, cannot certainly be reproached with being itself of an exciting nature.

A further error, very widespread among the

public, consists in the confounding of electricity with *animal magnetism*, and there are many who stigmatize physicians making frequent use of the electric current as "magnetizers." It need hardly be observed that animal magnetism is, as its name is sufficient to indicate, something entirely different from the electricity generated by galvanic batteries and faradic apparatus, as well in physical as in all other respects.

Another prejudice against the employment of electricity in therapeutics entertained by some, consists in the belief that electricity gives temporary relief, but does not cure disease ; or, that in conditions of debility for example, a transient stimulation is obtained, which is followed by a proportionately greater degree of relaxation. It requires scarcely to be stated that both these views are entirely imaginary. As to the thoroughness of the cure, modern pathology teaches us to trace back to the nervous system a great number of diseases, and there is scarcely to be found a single remedy that acts more directly and intensely on the nervous system than electricity. To this fact is due the success, often bordering on the miraculous, that in so large a number of cases is obtained by the application of electricity. As to the momentary excitation, said to be followed by a relaxation so much the greater, such need not be

feared from the judicious employment of electricity, but at worst from its misapplication, as everything is subject to being misused.

The prejudices and erroneous opinions under consideration are to be found, however, as heretofore remarked, almost if not quite exclusively among the laity. In the medical world—with some few insignificant exceptions—views in accordance with the advancement of science have long since obtained a foothold, as I have personally had and continue to have occasion to observe from the great number of patients sent me from far and near for electrical treatment.

The more general character of the present treatise does not admit of the dwelling at length upon special forms of disease, and I will therefore content myself with discussing briefly the principal varieties, and to treat more minutely of one or other of them only.

The great territory of paralyses and pareses of every kind is that in which above all others the electric current has for many years past found employment in a manner more or less appropriate, and this comes indeed pre-eminently within its domain. Not that electricity is less efficacious in other forms of disease ; but in paralyses it is to some extent the sole remedy, because other methods of treatment, with few

exceptions, do not in the remotest degree approach it in point of efficiency.

As I do not intend in the present essay, which is to be as concise as possible, to enter into details, for which I must refer the reader to my "HAND BOOK OF ELECTRO-THERAPEUTICS" (Vienna, 1869, Braumüller, court publisher), as well as to numerous articles in scientific domestic and foreign journals, I cannot dwell minutely on the manifold varieties of paralyses and pareses that find in the application of electricity their most trustworthy, and very frequently their only remedy. I must rather limit myself, in accordance with the object of these lines, to enumerating the different varieties of paralysis, and, with the exception of a few brief remarks, to point out especially that which we are justified in recognizing as progress in the method of electrical treatment belonging to a recent period.

It is well known that among paralyses and pareses we distinguish those that have their origin in the brain or spinal cord (known as *central*), and others that originate in a mere local affection of the parts in in which they occur (*peripheral*). Of the central paralyses, those proceeding from the brain (through cerebral hemorrhage, tumors, embolism, or intra-cranial inflammatory processes), were more particularly

held to be above all others best left to themselves, and I will not deny that I also was formerly wont to content myself in most of these cases with electrizing the palsied arm or leg, while I often hesitated to let the electric current act on the brain directly. As among the thousands of cases of nervous disease that have come under my observation, brain affections were numerously represented, I have had ample opportunity to enrich my experiences in this respect, and based on these, I proceed not infrequently, and with the observance of the proper precautionary measures, to the direct electrical treatment of the brain. I recall among others a case sent me by Professor Duchek, in which the great sensitiveness of the patient notwithstanding, the electric current, employed with proper precaution, was very well borne.

At the same time the electrical treatment of the paralyzed arm or leg must not of course be neglected, because otherwise the protracted (frequently for months and years) functional inactivity of the paralyzed parts may finally bring on muscular atrophy, and the use of the limb become very questionable from this cause alone.

The chapter of spinal paralyses and their electrical treatment would, if exhaustively treated, fill volumes, and volumes have indeed been written on the subject.

So much has however been accomplished, that physicians who stand high in point of science have ceased to class spinal paralyses, the so-called traumatic spinal paralyses—paralyses strictly speaking—as well as the disturbances of co-ordination proceeding from the well-known affections of the posterior columns of the spinal cord, commonly termed "locomotor ataxia" (*tabes dorsualis*), and the resulting inability to walk and to stand, among the affections before which the healing art stands with its hands tied. It is on the contrary exactly in these forms, and particularly in *tabes dorsualis*, that the electric current renders excellent service, and stands first among all the remedies that are employed against the affection in question. With all due modesty I must say that my assistant physicians and I may count it as a not inconsiderable merit in the cause of suffering humanity, that we have, in the course of years, enabled a very large number of such unfortunate paralytics, who sought help in my special department of the imperial royal hospital, and in whom the misfortune of poverty was superadded to the disease, to make use of their limbs once more in a more or less perfect degree, and that many a one who was brought into the sick room on a litter, was enabled to leave it on his own legs.

The latest advances in pathology have contributed materially towards clearing up the relations of the sympathetic nerve to that terrible disease that we know and dread under the name of progressive muscular atrophy (*Atrophia muscul. progress.*) As we possess at the present time no remedy by means of which we can influence even to a degree the sympathetic system, except the electric (galvanic) current, and as we likewise have no other means to effect, even approximatively, contractions, and thus a sort of passive gymnastics, of the affected muscles, no further commendation is needed for any one who has watched but a few cases even of muscular atrophy, which converts the strong arm and the vigorous body into a fleshless skeleton.

It is to be explicitly understood in this place, however, where the question is not one of exalted therapeutic fancies, but rather of the results of sober observation (which, although elsewhere generally, is here particularly, necessary), that we are rarely able to give back its original fulness to the muscle that has once degenerated from its integral condition, but must content ourselves on the one hand with arresting the progress of the disease, on the other with exalting to the highest degree the activity of the still intact muscular fibres. But in doing even this we accom-

plish a great deal, because we are then not unfrequently enabled to check also the violent pains accompanying the atrophy. Ordinarily these pains, which nature seems to send as a warning to those afflicted, are misconstrued and looked upon as rheumatic, until the rapid emaciation brings to light the true character of the disease. Not unfrequently the proper moment for the commencement of the electrical treatment, which here should be initiated as early as possible, is let slip, and it is altogether much to be regretted that as a rule electricity is had recourse to only when all medicaments, cold water cures, other bath cures, a legion of domestic and secret remedies etc. have been already and unavailingly employed. When a series of unsuccessful therapeutic efforts have destroyed both the courage and confidence of the patient, and the disease has reached its climax—then only electricity is called upon, like the triarians of ancient Rome, to advance against the enemy and conquer the disease. It is surely a proof not to be undervalued of the mighty power of the electric current, that by means of it we are enabled even under such unfavorable conditions to accomplish important results. These would however be still greater and more complete were the remedy employed when the disease has not yet reached its height and the

organs have not yet suffered so deeply as is the case later on.

I think I may be permitted in this place to ask: Why is it that all those physicians who, with respect to the diagnosis as well as the therapy of disease, stand highest among the profession, place electricity in the first rank among remedies for nervous diseases, so that so celebrated a clinical physician as Griesinger has pronounced electricity an invaluable remedy?* The reason for this may, we believe, be sought in that the process of the development of electricity (particularly of galvanic electricity) may be counted among the most sublime processes of the inorganic world that we know of, so that I have termed it—as I believe, not unjustly—in my inaugural lecture at the University of this city, a species of "inorganic life" (excuse the *contradictio in adjecto*). At all events the process of the development of galvanism is one that in many respects reminds one of that which presumably takes place in nervous life, although research in this direction has not yet gone beyond the bounds of mere conjecture.

Paralyses due to chronic poisoning, such as are

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* Eulenburg and Guttmann: "The pathology of the Sympathetic." Berlin, 1873. Hirschwald. (Preface, p. iii.)

wont to occur from mercury, lead, arsenic, and verdigris, likewise find in the electric current a valuable remedy. Akin to these forms are the paralyses following acute constitutional diseases (typhoid fever, small pox, diphtheria etc.*), and some chronic affections (syphilis, rhachitis, osteo-malacia, scrofulosis, *et. al.*) which to a certain extent are due to poisoning by organic matter. I have at the present time under treatment a highly interesting case of disturbance of speech (aphasia) following small pox.

If it be indubitable that the healing art of the present day (and especially electricity) is capable of giving relief in at least a great proportion of the so-called *central* paralyses, those which proceed from the brain or spinal cord, it appears obvious that this must be the case in a much greater degree in the so-called *peripheral* paralyses, that have their cause merely in the spot where the paralysis manifests itself—*i. e.*, within a more or less circumscribed area. I will state briefly only the several forms in which the electric current renders such excellent service. Before doing so, however, I will touch upon still another form of

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* I obtained a very good result in paralysis following diphtheria, in a case referred to me by privy councillor Von Schmerling, by using galvanism and faradization combined.

paralyses, to which, according to the present state of science, a fitting place can scarcely be assigned. I allude to hysterical paralyses.

Hysteria (derived from the greek ὑστέρα, the womb) is not, it is true, to be treated from this "one point" only, as our celebrated Faust poet maintains; but this too fruitful source of innumerable complaints must yet receive the first consideration. Fortunately we are able to act very decidedly also on the female generative organs by means of the electric current, and thus electro-therapeutics affords us the certainly very estimable advantage of influencing very energetically, by means of the same powerful agent, the source of the complaint as well as the nerve-tracts in which the reflex symptoms appear, the centre as well as the periphery.

Probably every physician who sees much of nervous disease has among his patients a large number of hysterical ladies, who, as a general thing, designate their affections as "nervous," so that in the mouth of the non-medical public the expressions "nervous" and "hysterical" are apt to mean to some extent the same thing. With this identification, which was formerly still more *en vogue* than is the case at the present day, was connected what for those concerned proved a very deplorable error, which even at the present day

occurs now and then, and against which a very decided stand must be taken. The error in question is that, strange to say, the often insupportable sufferings of such unfortunate women and girls were held to be "fancied," looked upon as the phantoms of an overexcited imagination. The usual remedy consisted in "diversion" and the advice to exercise as much self-command as possible. This was based upon the view that the disease consisted in nothing but a changeable humor, while a thorough and sufficient searching for the cause was dispensed with. In this respect modern practice has done justice to a great number of much-complaining though generally patient and enduring patients, by treating them with suitable remedies, among which electricity occupies the first rank, instead of giving them reproaches and admonitions. This holds good not only of the paralyses and pareses occurring in hysterical women, but also of other forms of nervous affections; of spasmodic or neuralgic conditions and (in contradistinction to these) of the diminution of normal sensibility even to anæsthesia.

Peripheral paralyses are of varied import, according to the locality in which they occur. In all forms and whatever their location, among the various remedies electricity stands first.

Paralyses of the muscles of the eye, which, by reason of the diplopia and the dizziness not unfrequently resulting from this, inspire the patient with a great deal of fear, are often removed with surprising rapidity through galvanic electricity, by inducing reflex muscular contractions. Thus I call to mind a woman (a patient of Professor Kainzbauer), who suffered from a complete paralysis of the oculo-motorius. The upper eyelid hung down flaccid, the three recti muscles supplied by the motor oculi were absolutely incapacitated. Galvanism cured the affection completely.

A paralysis of the external rectus muscle, of interest by reason of the manner in which it was produced (the patient, a Pole about forty years of age, had, in a fit of rage, rolled the eye violently outward, and was subsequently unable to move it in that direction), disappeared under the influence of the faradic current. I have however observed, in paralysis of the external rectus muscle of the eye, excellent results from the galvanic current also; thus recently in a case referred to me by Professor Von Arlt. Paralysis of the interior muscles of the eye I have also seen to disappear after galvanization of the sympathetic nerve, so far as a disappearance of the respective functional disturbances warrants a conclusion to that effect. The same holds

good of the muscular fibres that regulate the size of the pupil.

Paralyses of the face, which in the majority of cases are of rheumatic origin, are among the forms of disease that inspire with not a little terror those afflicted by them. And truly, the impossibility of closing the wide-open tearful eye, the discharge of saliva from the half-open angle of the mouth, the marble-like immobility of the entire side of the face, on which the patient is unable to smile, to point the lips or puff out the cheeks; where speaking and deglutition are impeded (not to speak of the great deformity), are calculated to inspire the layman with great concern. Fortunately it is exactly here that the electric current, especially (and often exclusively) the galvanic current, is of immense benefit, only this form more particularly requires a thorough comprehension of the method, in order not unavailingly to subject the patient to faradic currents that are frequently without effect, and thus to neglect the employment of galvanism. One of the most aggravated cases of unilateral facial paralysis,* among

* Difficult confinements are sometimes followed by facial paralysis, as I have repeatedly had occasion to observe.

the many patients of the kind whom I have attended, occurred in the person of an Italian court lady, who was referred to me by Professor Von Sigmund, and who was completely restored by the use of electricity.

Paralyses of the tongue, when not of central origin, readily yield to the electric current, and one of the chief causes of troublesome disturbances of speech and of swallowing becomes thus removed. The same is true of the occasionally very aggravated paralyses of the palate, that not unfrequently follow diphtheria.

The electrical treatment of paralyses of the muscles of the larynx, which, in my laryngoscopic hospital as well as private practice, I have very frequent occasion to employ, is probably one of the most gratifying of the various utilizations of electricity. An attainment in therapeutics is best estimated retrospectively, by recalling the period when it was not available. I therefore dispense with citing individual from among the many cases of paralysis of the vocal cords that I have treated, and will make mention of only one case, in which the electrical treatment of such a paralysis, at that time not recognizable for want of the laryngoscope, would in all likelihood have saved a human life.

It was in the years of my studentship, that at one of our mineral springs I met a gentleman who suffered from complete aphonia. The herculean frame of the patient spoke against any general tuberculous affection, a merely local inflammatory or even ulcerative process was excluded by the absence of all symptoms (pain, cough, expectoration, etc.), while the absence of any difficulty whatever of respiration precluded the assumption of a laryngeal tumor of any considerable size. A smaller tumor in the larynx would on the one hand have scarcely produced so complete an aphonia, on the other hand it would probably in the course of years have grown larger. But when I saw the patient the affection had existed already several years, during which the symptoms had remained tolerably uniform.

The likelihood that the trouble was nothing further than a paralysis of the vocal cords, was therefore not to be rejected. With a view to remove this affection the patient had already been sent to springs in all directions, of course in vain. I was informed subsequently that the sufferer, out of despair engendered by this persistent aphonia and the consequent impossibility of pursuing his avocation, had committed suicide. A case such as this is strongly illustrative of the importance of the advances made in

diagnosis and therapeutics by specializing individual branches.*

I will add a few words on the treatment of paralyses of deglutition (paresis œsophagi). These manifest themselves by a difficulty or impossibility of swallowing, and are sometimes, when presenting themselves in a mild form only, overlooked in so far as that the phenomena are attributed to other pathological processes. The electrical procedure is as simple as it is certain. It consists in the exciting of deglutitory movements, by placing the one electrode (copper pole) on the nape of the neck, and with the other (zinc pole) stroking the neck (over the pomum Adami), which will at once be followed by energetic movements of deglutition. Of late I have modified this procedure, so that at first I excite deglutitory movements when the mouth is empty, while later on I incite and assist the deglutition of a bolus by means of the electric current, and in this procedure I gradually weaken the current more and more, until finally swallowing becomes possible without its aid. In this manner I treated most successfully a girl eleven years

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* A highly interesting case of intermittent paralysis of the vocal cords that was characterized by alternate sonorous speaking and aphonia following it, was sent me by Prof. Von Loebel. A complete cure was effected by the use of the electric current.

of age, the patient of Dr. M. Schlesinger, a case which I mention again especially because it goes to prove, like innumerable other cases, that even the most tender and timorous lose all dread of the electric current as soon as they have once become familiarized with it, and have become disabused of their prejudices. The girl just mentioned, a nervous, somewhat anæmic child, could at first be scarcely prevailed upon to approach the table by the side of which was placed the electric apparatus, and yet I succeeded in depriving the patient of all fear of the treatment she had so much dreaded. It cannot be too often repeated that the electric current, and this applies to the galvanic as well as the faradic, produces no shock and no pain nor any excitement of the nervous system, provided the treatment be conducted by skilled hands; for we possess in the various moderators, the gradual strengthening of the current, etc., means sufficient to avoid all disagreeable surprise to the patient. The electric current gives pain only when it is the intention of the physician to produce pain through its agency, *i. e.*, to use it as a cutaneous irritant, in like manner as this is done by means of sinapisms and other cutaneous irritants. The pain produced by it is also more or less analogous to that produced by a sinapism, but is distinguished from this

latter by the fact that under repeated electric irritations of the skin the latter is left perfectly intact, and even the most delicate complexion remains unimpaired.

In paralyses or pareses of the pectoral muscles—probably less often an idiopathic condition than one of the phenomena of general processes (especially of progressive muscular atrophy)—we possess in the electric current the most efficient remedy to combat the affection. It should not be forgotten to mention here the procedure recommended by some in pulmonary tuberculosis of obtaining an arrest of the disease by electrization of the respiratory muscles, and as the result of this an increased activity of the lungs.

With regard to paralyses and pareses of the intestines, it is well known that in obstinate pareses of the *muscularis* and the resulting peristaltic constipation, movements can readily be produced by faradization of the abdominal muscles. Galvanism, however, acts still more intensely, when, as I was first in Germany to publish a case in point, co-observed with me by Prof. Dittel, it is made to act directly on the rectum. In one case the constipation, which, after the fruitless employment of the strongest purgatives, made it necessary for weeks to evacuate the fecal masses mechanically, yielded almost instantly to the influence of

the electric current. Among the long list of electro-therapeutic successes, the result obtained in this case may be counted among the most brilliant.

Paralyses of the bladder, when not the result of central lesions, usually likewise yield readily to the influence of electricity—mostly faradic. Even in children, where pareses of this kind are usually attended with *enuresis nocturna*, it is very easy to apply electricity, it being necessary only to use a very mild current at first, which may be gradually made stronger. The little ones may thus be made to bear currents of considerable intensity with ease. In the vesical paralyses of adults, a co-existent moderate vesical catarrh constitutes no obstacle to the electrical treatment, provided this is instituted with the observance of proper precautions.

I have recently treated a patient from Hungary, referred to me by Prof. Dittel, with the faradic current, while a vesical catarrh accompanying the paresis disappeared simultaneously under the influence of the appropriate local treatment.

Paralyses of the extremities, the upper as well as the lower, often afford a fine field to electricity. As to the pareses that are among the phenomena of disorders of the brain and spinal cord, of affections of the sympathetic nerves, of other acute and chronic consti-

tutional diseases, and particularly of toxic conditions, they have already been spoken of. It needs only to be remarked here, that even where we do not succeed in curing the original disease with the desired rapidity, the electrical treatment of the paralyzed arm or leg appears very useful and necessary as a prophylactic against muscular atrophy. In peripheral paralyses, as these occur from colds, as rheumatic, from external injuries (blow, thrust, fall, contusion, cut, stab, etc.), as traumatic (in which category are to be placed also the paralyses from fatigue consequent on over-exertion), wasting and muscular atrophy supervene still more rapidly. The swiftest aggressions, however, of paralysis and wasting, occur from articular, and after these from neuralgic affections, both of which forms self-evidently impair motion. It is superfluous to point out the brilliant results obtained here by the electric current. They are so numerous that there are probably but few physicians who have not had occasion to personally observe, at least some one case of this kind.

The importance of electricity in orthopædics is too well known to render it necessary to enter into details in this respect. In many cases of curvature of the spine, the arms and legs, protrusion of the scaplæ, etc., other treatment (different apparatus, gym-

nastics) is appropriately aided by a suitable electrical treatment, and the re-establishment of the normal shape thus materially hastened, and sometimes rendered possible only through electricity.

These brief observations are by no means exhaustive in respect to the due appreciation of electricity in view of its efficacy in paralysis. It is not my intention, however, to present in these lines an exhaustive treatise on electro-therapeutics, but merely to sketch what is newest and at present the most generally adopted in the utilization of electricity in medicine. I therefore conclude the disquisition on paralyses and proceed to the discussing of the electrical treatment of spasmodic affections.

The class of which we shall now speak is a large and important one. From the slightest transient involuntary contraction it extends in uninterrupted succession to the severest attack of epilepsy and chorea. Here also (as in paralyses) we distinguish those spasms that have their cause in cerebral and spinal affections; then those that originate in the muscles where they manifest themselves, and finally those that are the result of reflex action from some point of the periphery on the centre.

If I commence by discussing the electrical treatment of epilepsy, I can of course not deny that the

present state of pathology has not as yet reached a point where the indications for the use of electricity in epilepsy would appear clearly defined, and some fixed method applicable to the majority of cases arrived at. As this disease, however, has unfortunately become very wide-spread—I at least have a great many such patients come to me for treatment in hospital- as well as private practice—it was rendered possible through continued experimenting empirically to arrive at an electrical procedure, which has done me good service and deserves the preference over other modes. This is the galvanic treatment of the sympathetic nerves, in regard to which one of my assistant physicians published some detailed communications in a medical journal which bear testimony to the favorable results obtained.

In chorea electricity has met with considerable success, and it is in the most aggravated forms especially of this disease that the electric current achieves its greatest triumphs. I will make mention here of only one vehement case, which I observed in a girl about thirteen years of age. There was scarcely a single muscle in the body of this child that was not violently agitated; the head, upper and lower portions of the trunk, arms and legs were thrown in all directions; the hair concealed from

view to some extent the flushed face, which was covered with foam and sweat; there was neither sitting, standing, walking or speaking, and deglutition was to some extent only possible. To this was superadded a psychical excitement readily comprehensible. The treatment was in accordance with my usual procedure (galvanization of the spinal cord); the result was most brilliant. The girl, who was the daughter of an innkeeper at Mähren, was completely cured; spasms and psychical excitement disappeared entirely; sitting, standing, walking, swallowing and speaking were accomplished in a perfectly normal manner.

In clonic spasms, where these do not occur in connection with conditions of general exhaustion, I have observed good results from galvanic as well as faradic electricity.

As effusions of blood in the brain and other cerebral lesions lead to paralysis, so also do they give rise to spasmodic conditions and contractions of the most varied kind. In contractions that have been produced in this manner I am in the habit of adopting a double procedure; electrical treatment of the affected extremity, and cautious action on the centre itself; best by galvanization of the sympathetic nerve—observing, of course, the necessary precautions.

I have pursued an analogous course in contractions from spinal affections, while formerly both spasmodic affections were looked upon by some as an absolute *noli me tangere*—an assertion that can no longer be unconditionally maintained in the present state *of electro-therapeutics.**

Hysterical affections, as they lead to paralysis, may also lead to spasms in the greatest variety. Even though these from their very nature do not bring with them any great danger, they yet annoy the women affected in an extraordinary degree, and sometimes lead to psychical affections of more or less import, which may, however, become developed in all forms of hysteria. For such nervous females, then, electricity presents a highly valuable remedy in two respects: not only does it enable us to combat the original disease, but it lies in our power also to diminish and abolish the spasms of individual muscles, partly by the constant galvanic current, partly by electro-cutaneous irritation; or by exalting the activity of the antagonists by faradic stimulation.

I believe this to be the most fitting place to make

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* It follows as a matter of course that all central treatment must be dispensed with when we have to do with an intrinsically incurable affection of the brain or spinal cord, or of tissues surrounding these (as for instance a *pseudoplasma*, *aneurysma* etc.).

mention of a very remarkable case that I observed in my division. There were represented at one and the same time four different nervous diseases in a girl of twenty years of age. Besides a spasmodic contraction of the upper arm (*m. biceps*), the patient suffered from chorea, nervous attacks of coughing and attacks of profound syncope, which, although calling to mind epilepsy, could yet not be designated as such, the patient presenting rather the picture of a person quietly sleeping, from which sleep, it is true, she could be roused by nothing. All four affections disappeared completely under the influence of the electric current.

Rheumatic affections also are to be placed among the forms of disease that, giving rise on the one hand to paralysis, on the other hand may originate spasms and contractions in the greatest variety. Of spasms, they are more particularly those of the face (so-called mimic spasms), spasms and contractions of the cervical and nuchal region, that produce obliquity of the head in various directions (*torticollis*) ; also spasms and contractions of the arms and legs which, when originating in this manner, can be removed more or less completely by electricity.

A peculiar form is presented by the so-called "writer's spasm." This occurs at times in persons

who, by over-exertion, have placed a certain group of muscles in a state of irritation, in consequence of which the phenomena of spasm appear in the fatigued arm. These spasms occur, however, not only as the consequence of over-exertion by writing, but also from long-continued exertion of the arm otherwise, as by playing piano, sewing, etc. The sooner electrical treatment is instituted in these cases, the more is of course to be hoped from it.

Spasm of the voice (convulsive attacks of coughing with synchronous weakness of the voice, even to aphonia), nervous asthma, spasm of the heart (proceeding from the cardiac plexus), spasm of the diaphragm (which manifests itself by so-called hiccoughing), nervous vomiting,* intestinal spasm (proceeding from the *plexus mesentericus*), all find one of the most excellent remedies partly in the galvanic and partly in the faradic current.

I have in the foregoing lines dwelt upon the disturbances of motion with respect to where they manifest themselves as paralyses and general pareses, as well as where, in contradistinction, they take the form of spasms and contractions, and I now proceed

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* In two cases of nervous vomiting with synchronous cardialgia, I observed especially good results from the electric current.

to sketch as briefly as the importance of the subject will admit, the influence of electricity on the disturbances of sensation.

Of these also we distinguish two forms of morbid conditions ; *a*) Diminution of sensation extending to its entire absence (anæthesia) and *b*) Enhancement of the normal sensibility (hyperæsthesia).

Anæsthesia may affect either the skin alone (cutaneous anæsthesia), or it may extend deeper down to the muscular layers (muscular anæsthesia). In either case we may have to do with a merely local affection, or the seat of the disease may be more deeply situated ; in the brain, the spinal cord, or sympathetic system. Hysteria is also very frequently accompanied with more or less anæsthesia. In all these affections electricity is in most of the cases a sure remedy, excelled or even equalled by none other—by means of which we are enabled to remove the different degrees of diminution of sensibility. The current is here directed partly to the nervous centres partly to their peripheral ramifications, and it is especially by electric irritation of the skin that we are sometimes enabled to obtain brilliant results.

In the various forms of paræsthesiae (which are wont to be designated by the patients as "false sensations"), electricity is an excellent remedy. It

would lead us too far to attempt even approximately to describe these "false sensations;" their name is legion; nervous ladies can speak on the subject.

I will here touch briefly only upon the influence of electricity on a few groups of diseases, which, although not strictly speaking, to be classed among anæsthesiae, are yet best treated of in this connection.

Not only disturbances of sensation, but those of the special senses also have been successfully treated by electrical means. I have made specially interesting observations concerning the electrical treatment of the loss of the sense of smell (anosmia), and have here repeatedly succeeded in restoring the lost sense by the use of electricity.

Electricity likewise plays an important part in the treatment of male impotency, of which particularly of late years numerous cases have come under my care. It is to be lamented that patients of this class sometimes apply for electrical treatment only after they have been experimented upon according to all practicable as well as impracticable methods, often by charlatans of the worst sort. Here also, as in most other affections, the rule holds good of initiating the electrical treatment as early as possible, and in the majority of cases, where no important structural changes (particularly atrophy) have taken place, a

favorable result can be obtained. But even where the disease is already very far advanced and considerable changes have occurred, the hope of success is not by any means to be abandoned. In the ambulatorium of my division I have observed a young man in whom all hopes of recovery appeared to have been abandoned, and yet the patient found occasion to acknowledge the beneficial influence of the electric current.

I likewise witnessed very good results in the case of a patient referred to me by Professor von Loebel, where, in the affection under consideration, I employed exclusively electric irritation of the skin.

If electricity be justly extolled as a specific in nervous diseases generally, this holds good more particularly of the electrical treatment of male impotency. Whosoever estimates properly the importance of this affection, where not unfrequently great interests are at stake, will also know how to value so excellent a remedy as electricity.

As on the one hand sensibility may become diminished even to its entire extinction, so on the contrary it may become abnormally increased. This increase we know as hyperæsthesia (excessive irritability), and when this is accompanied by a painful

sensation (strictly speaking) in distinct nerve tracts, as neuralgia.

It is again hysteria which is not unfrequently accompanied by the most torturing hyperæsthesiæ of every variety, and there is scarcely a part of the human, especially the female body, that is not liable to be thus attacked. We have here vague pains in the various nerve tracts, that manifest themselves in no fixed localities, hypererethism in different places, as of the joints, that may be increased to become unendurable pain ; troublesome sensations, as dragging and tension, pressure and boring ; the so-called hysteric ball (where patients have the sensation of a ball or something similar moving from the epigastrium upwards towards the throat) ; pains in any of the thoracic and abdominal viscera (caused by the affection of the respective nervous plexus or of individual nerves), especially a sensation as of tearing and (to be hereinafter again mentioned) uterine pains, not unfrequently the point of origin of the whole series of nervous phenomena, that manifest themselves principally as spasms of some or others of the muscles and as neuralgia in parts often very remote.

Electricity, galvanic as well as faradic—directed partly to the nervous centres and partly to the periphery—here renders pre-eminent services ; it is

especially electro-cutaneous irritation by means of the electric scourge that sometimes gives almost instant relief.

There exists scarcely any disagreeable sensation that has not been experienced at some time or other by nervous females, and the most fertile imagination can hardly approach reality in this respect. Sensory delusions (so-called "false sensations"), hypererethism, that often manifests itself in the most peculiar and disagreeable manner, are, in addition to pareses, paralyses, spasms, anæsthesiæ (as already mentioned), of frequent occurrence. Sometimes the further development of such phenomena brings with it disturbance of a psychical nature; conditions arise that exhibit now the character of depression, and again (in contradistinction to these) that of exaltation. Even in these aggravated cases I have repeatedly succeeded, by electrical treatment of the sympathetic system, in obtaining considerable improvement and sometimes a complete cure. Thus I call to mind the case of a French lady, a teacher of languages (in the ambulatorium of my division), who was afflicted with melancholy to such a degree that she had repeatedly manifested the intention to commit suicide. But few applications of electricity were requisite to completely remove the affection.

I cannot refrain from observing on this occasion that, as far as anything may be expected at all from any course of treatment in so-called diseases of the mind, electricity appears justified in laying claim to special consideration in this respect.

Of irritable conditions of individual nerves I will cite none but hyperæsthesia of the auditory nerve, that which is known as nervous tingling of the ears. In this affection, which in its more aggravated forms often become fairly agonizing, galvanic as well as faradic electricity may be employed.

I come now to speak of a form of disease which presents to the electric current a fertile field of usefulness; I refer to migraine or nervous headache (*hemicrania*). It were superfluous to enter more minutely into the phenomena which mark this affection, which, by reason of its great frequency, is universally familiar, and which, by the intensity and obstinacy of its attacks, has driven many a patient to despair. To this may be added that in migraine the entire materia medica deserts us to a certain extent, limiting the treatment in most of the cases to rest in a darkened chamber, cold fomentations, the administering of black coffee, etc. Here then electricity is a true specific; one which when used in a proper manner, rarely fails to assert its brilliant efficacy. I

usually have recourse to electrical treatment of the sympathetic nerve, and can point to exceedingly favorable results in hospital as well as private practice. From among the large number of cases I will cite only three, that were referred to me for electrical treatment by privy-councillor von Widerhofer. The first of these was the case of a young lady, in whom the most violent attacks of headache occurred in so persistent a form as to engender the suspicion of tuberculous disease of the membranes of the brain. The migraine was removed by a few electrical applications.

The two other cases were those of the Princess of ——— and her daughter aged ten years; which latter case I cite particularly in view of its fitness to illustrate the beneficial effects of electricity in the migraine of childhood.

This is the proper place also to make mention of one of the most tormenting of affections, namely, sleeplessness (*agrypnia*). In this respect also we possess in galvanic electricity a highly valuable remedy, which in many respects deserves the preference over morphia and hydrate of chloral.

I will add here a few words on neuralgic conditions, a class of affections which, when (as is frequently the case) of a severe and obstinate character,

is calculated to drive both the physician and the patient to despair. Whoever has had occasion to observe even a single attack of violent facial neuralgia, will not look upon this assertion as extravagant. It appears self-evident that under these circumstances we welcome any and every remedy that brings with it a cure, or even alleviation, and thus galvanic as well as faradic electricity appear of pre-eminent value in the treatment of this terrible disease.

In the electrical treatment of *tic douloureux* (the facial pain of Fothergill, neuralgia of the fifth pair), I have had occasion to observe favorable results from various modes of electrical applications. Thus, in a case that was sent by Prof. Billroth to my division in the hospital, from the descending constant galvanic current; in another case of the most violent bilateral facial pain, from galvanic treatment of the sympathetic nerve; in several other cases from faradic currents, etc.

In the tormenting attacks of intercostal neuralgia, electro-cutaneous irritation by means of the electric scourge was attended with the happiest results; the same was the case in lumbo-abdominal neuralgia. Neuralgia of the arms and of the legs (sciatica) are likewise wont to disappear rapidly on electro-cutaneous irritation. I have thus not unfrequently

been able to remove the so-called "Hexenschuss" in a short time.

The exceedingly painful neuralgia of the cardic plexus, whose attacks are often accompanied by the most vehement phenomena, so as sometimes to put the patient into a state of great excitement and fear, were repeatedly abrogated by electricity.

I come now to the discussion of some forms of disease, whose connection with the nervous system has only of late been partly established—in some respects not at all or at least not with desirable accuracy—in which, however, electricity has rendered exceedingly valuable service, so much so as to merit at least a brief notice in this connection.

First among these diseases stand gout and rheumatism. The mere mention of the names of these two diseases, both of such very frequent occurrence, and often so excessively painful, and paralyzing all action, is sufficient to make us estimate properly the importance of any remedy from which we may, more or less reasonably, expect to obtain relief. Now, even though it be true that (up to the present at least) there is no method of treatment guaranteeing certain relief, we are yet justified in asserting that electricity belongs among the remedies that exhibit the greatest degree of efficacy in the affections under consideration, and

by means of which we would obtain still more favorable results, were it not that the electric current is sometimes called into requisition only after all practicable and impracticable drugs and domestic remedies have proven useless. Recent cases of rheumatism, readily yield to galvanic and faradic electricity. Thus I cured a rather severe case of muscular rheumatism occurring in the person of the Prince of ——— (a patient of privy-councillor the Baronet von Loeschner) in a very few sittings. But inveterate and neglected cases also of gout and rheumatism are often relieved or cured by electricity; nor does it matter whether the affection be articular or muscular. The most remarkable instance of the well-nigh miraculous remedial power of the electric current I witnessed in the case of a gentleman between fifty and sixty years of age, sent me for electrical treatment by privy-councillor Professor Helm, who, tormented by severe gout in the swollen joints of the knee, shoulder, elbow, hands and fingers, was scarcely able to move, had already employed all possible spring-waters and drugs in vain, and yet, after he had given up all hopes of being cured, was, by the employment of electricity, enabled to walk to his office and there to write. This is one of the most brilliant cases that has come under my observation; the multitude

of others in which favorable, often astonishing results have been obtained, is too great to cite individual ones.

In acute articular as well as muscular rheumatism, electricity is also, so far as my experience goes, a very valuable remedy, when the first violent symptoms have abated somewhat; and it should be made a general rule to lose no time in gout or rheumatism, but to initiate electrical treatment as early as possible, the results of which will, in the majority of cases, certainly be very satisfactory.

The paralyses or muscular spasms and contractions that sometimes remain after rheumatism or occur synchronously with this, are likewise, as already observed heretofore, best treated by means of electricity.

As in the articular affections of a rheumatic or gouty nature, so also we find that in other articular affections, especially the so-called traumatic arthrites and articular swellings, occasioned by external injuries (blow, thrust, bruise, fall, etc.), we possess in electricity an excellent remedy, to employ which we should delay the less, in that not only incurable changes may take place within the joint itself, but more or less complete paralysis of the neighboring muscles is wont to supervene. Inflammations of

muscles and tendons as well as their sequelæ are also best treated by electricity, under the use of which effusions and other inflammatory products have repeatedly been caused to disappear.

The treatment of Basedow's disease, which is characterized by enlargement of the thyroid gland (known as "goitre"), palpitation of the heart and exophthalmic goitre, and which is no doubt dependent on an affection of the sympathetic nerve, is most efficiently and rationally conducted by means of electricity, from the proper employment of which we are justified in anticipating the most satisfactory results. The more immediate effect is usually a moderation of the excessive cardiac action and a discontinuance of the palpitations, which are followed by the disappearance of the remaining and very irksome and sometimes fear-inspiring symptoms.

This would appear a fitting place to remark that those cases also of enlargement of the thyroid gland in which the other symptoms of Basedow's disease are wanting, where thus we have to do with simple "*goitre*," are frequently brought to a rapid cure by the use of electricity. The mode of applying the remedy varies, the galvanic current being employed in some cases, the faradic in others.

As I have already stated in my hand-book of

electro-therapeutics, I have succeeded repeatedly in curing cases of intermittent fever by electrical treatment of the sympathetic nerve, and I have at the present time frequent occasion to treat intermittents in the manner indicated. In the majority of these cases no quinia at all had been taken; the influence of change of locality was likewise excluded, the patients becoming affected in Vienna and surrounding places, and remaining there after their recovery. In those cases where the electrical treatment had been preceded by the use of quinia, the latter had remained unsuccessful. Enlargements of the spleen likewise disappeared under the use of the electric (faradic) current. In this respect great interest attached to an aggravated case of intermittent fever with considerable splenic enlargement occurring in the person of a colleague, who acted as operating surgeon in Billroth's clinique, and was attended by my assistant Dr. von Mertens. From sitting to sitting the attacks of the intermittent fever became diminished and the splenic enlargement decreased, without the place of abode being changed, or any anti-febrile medicine taken.

The pre-eminent efficiency of electricity in articular swellings of every kind has already been pointed out; it remains only to call attention to the invalua-

ble effects of the electric current in the removal of tumors generally. There is scarcely a tumor of any kind that cannot be removed by means of electricity. The mode of applying the current is here mainly of two kinds; where the tumor is capable of being absorbed, the ordinary manner of application will suffice; where, however, we have to do with tumors that are not absorbable, what is known as the electrolytic treatment (by means of acupuncture) is to be instituted. I have in this respect frequently obtained excellent results, and seen the tumors disappear rapidly under the influence of the electric current, as in the case of a lingual cancer, almost the size of a walnut (a patient of Prof. von Sigmund), in a single sitting. At all events this treatment offers us the not inconsiderable advantage of dispensing with the use of the knife or a candescent instrument, and thus sparing the patient the occasion for frequently great anxiety.

Strictures of the urethra also belong among the forms of disease in which much has already been done by means of the electrolytic effects of the current. The employment of electricity in this affection is practised more particularly in France, and the results are often the most satisfactory.

In dwelling on the manifold affections that we meet

with in nervous women, I have already found occasion to point to the connection of such affections with disease of the female genital organs, and it is almost unnecessary for me to observe how important it appears for the cure of the nervous trouble to remove the "female disease" with which this is connected.

In pain of the uterus (hysteralgia), it frequently becomes possible by means of the electric current to obtain not only a mitigation of the pain, but its entire abrogation. In especially persistent cases with violent symptoms, I sometimes combine with the electrical treatment intra-uterine injections of a solution of morphia, by means of a syringe which is constructed similarly to that employed for subcutaneous injections, and which with the aid of a speculum can readily be brought to the vaginal portion.

Disturbances before, during or after menstruation, or the non-occurrence of the menstrual flow (where not the results of constitutional anomalies or serious structural changes of the organ), are likewise treated most successfully by electricity. The current is applied either directly to the womb (which is an absolutely painless procedure) or is employed externally as an electro-cutaneous irritant in the neighborhood of the genitals. Electrical treatment of the uterus can

sometimes be employed advantageously also in displacements (versions, flexions, etc).

In the case of a patient in my division, whose uterus did not diminish in a normal manner after parturition, the use of the faradic current brought about the desired contraction and diminution of the uterus in a short time. That the electric current, even when applied externally to the abdominal walls, produces energetic uterine contractions, and thus materially hastens delivery where this is retarded by deficient uterine action, has been known for a long time.

I have made interesting experiments with galvanism in old neglected cases of leucorrhœa, where the zinc pole actually exercised a favorable influence on the mucous membrane of the vagina. This is the more easy of explanation, since we can obtain from a strong galvanic current very energetic astringent effects which certainly surpass those of alum, tannin, etc. If the strength of the current be still further increased, the effects obtained will be caustic. By cauterization with the galvanic current I have also repeatedly succeeded in curing ulcerating surfaces of the skin in various regions. Thus I recollect an ulcer of the lower leg somewhat larger than a hand, in the person of a man otherwise healthy, which by electric cauteriza-

tion was in a brief space of time reduced to one third its original size.

Hyperæsthesia of the vagina, which in some of the cases that have come under my observation was so intense that even the slightest touch of the genitals could not be borne by the patient, I have repeatedly seen to diminish and disappear under the influence of the electric current. It is only necessary here to operate by means of mild currents, which are very easily borne, while strong currents have an irritant rather than a soothing effect.

The remedial power of electricity in laryngeal affections of almost every nature is no less than in the forms of disease already mentioned. The electrical treatment of paralyses of the vocal cords which bring in their train partial or complete loss of voice, has already been touched upon (page 29) ; it remains necessary, then, to make mention only of one more procedure, which has been recently introduced by me among the methods of intra-laryngeal treatment, and may be looked upon as probably the most important advance in the treatment of laryngeal affections that has been made in Vienna since the death of Professor Turck.

I have reference to the process, by means of the chemical decomposing effects of the electric current

(electrolysis), of dispersing intra-laryngeal tumors, without, as was formerly the case, necessitating the introduction into the larynx of candescent or cutting instruments. Irrespective of the fact that the introduction of such instruments necessitates considerable and troublesome preparations, it becomes hazardous for the reason that the slightest, frequently unavoidable involuntary movement, coughing, deglutitory movements, etc., may be attended with very serious consequences, amounting sometimes to the permanent loss of voice (through injury of the vocal cords). In this respect the procedure introduced by me into practice offers very material advantages,* and the new instruments as suggested by me have already received the attention of numerous physicians.

In strictures of the larynx and of the trachea it is also expedient to utilize the electrolytic force, and in many cases it is possible in this way to counteract the attacks of dyspnœa that occur sooner or later. For this purpose also I have constructed a special instrument; likewise one for the cure of longitudinal rents of the vocal cords by means of the caustic effect of the electric current.

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* Further particulars on this subject can be found in my treatise: "On a new and safe process for the removal of laryngeal tumors." (*Vienna*, 1872, *Carl Czermack.*)

I have endeavored in the foregoing lines to present a brief resume of those forms of disease in which electricity has actually been employed with success. Copious as this abstract may seem, and numerous as may be the affections that in consequence would appear to come within the domain of electro-therapeutics, the foregoing catalogue of these yet does not even remotely lay claim to completeness. I have myself instituted manifold experiments with the electric current that have found no place here, and the same is true of many experiments made by others, which I could not as yet regard as sufficiently ripe for promulgation. At all events, even the foregoing list will serve to give the reader an idea of the grand enrichment of therapeutics by the rational employment of electricity.

In reference to the number of clinical observations mentioned in the beginning of these lines, as being at my disposal, I take this opportunity of saying a few words relative to what is being done in the special division * of our K. K. General Hospital, intended for the reception of diseases of the nervous system, chest and throat. Irrespective of the fact that the

* The official title, as is well known, is "Division for electrotherapy and inhalations," in accordance with the two therapeutic methods principally employed there.

beds of the division were, with few exceptions, almost constantly occupied, so much so that patients who desired admission could not be at once admitted for lack of room, the out-door department of the division for the free treatment of cases of nerve, chest, and throat diseases was, during the past year alone, taken into requisition by three thousand three hundred and eighty-three patients. As nearly all of these patients suffered from chronic diseases, and their treatment frequently required several weeks, an average number of from twelve to fifteen ordinations for each patient appears rather too low than too high an estimate; whence it follows that in addition to the treatment of the patients cared for in the hospital itself, from forty to fifty thousand applications were given in my division in the course of one year. In this I recognize the most conclusive proof of the high degree of confidence had by my colleagues as well as the suffering portion of the public in the method of therapeutics practised by me, and in the results already obtained I find the best guarantees for future usefulness.

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